P.T.C. Production & Trading Company AG

UNINTERRUPTIBLE POWER SYSTEM

SINGLE PHASE – 1kW / 2kVA

PTC-0110BA-1

MADE IN THE U.S.A

USER'S MANUAL

P.T.C.
Production & Trading Co. AG
P.O. Box
CH-6330 Cham
Switzerland

Phone: (+41 41) 740 45 54
Fax: (+41 41) 740 46 64
E-Mail: ptc@bluewin.ch
Web: http://www.ptcag.ch

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Table of Contents

		Page
	Safety Instructions	iii
1.	General Description	1
1.1	Intended Applications	1
1.2	Functional Overview	1
2.	Setting the Input Voltage Range	3
3.	Installation Instructions	3
4.	Front Panel Description	6
4.1	Front Panel: Main Components	6
4.2	Front Panel: Indicators and Switches	7
5.	Rear Panel Description	8
6.	Operation, Controls and Indicators	9
6.1	Turning the UPS ON and OFF	9
6.2	Visual Indicators	9
6.2.1	Normal Operation	9
6.2.2	Standby Mode	9
6.2.3	Input AC Failure	10
6.2.4	Overload Condition	10
6.2.5	Over Temperature Condition	10
6.3	Battery Test	11
7.	Taking Care of the Battery	11
7.1	Battery Service Life	11
7.2	Replacing the Battery Pack	12
8.	Communications and Remote Control	13
8.1	Dry Contacts Interface	13
8.1.1	Option 0 (Standard) Dry Contacts Interface	13
8.1.2	Option 1 Dry Contacts Interface	14
8.2	RS-232 Communication Interface	15
8.3	Remote ON/OFF Interface	15
9.	Specifications	16

List of Figures

		Page
Fig. 1	Block Diagram	2
Fig. 2	Electrical Connections (with Bypass)	4
Fig. 3	Electrical Connections (without Bypass)	5
Fig. 4	Front Panel - Main Components	6
Fig. 5	Front Panel - Indicators	7
Fig. 6	Rear Panel	8
Fig. 7	Dry Contacts - Option 0	14
Fig. 8	Dry Contacts - Option 1	14

List of Tables

		Page
Table 1	Dry Contacts Connector J3 Pin Assignment (Option 0)	13
Table 2	Dry Contacts Connector J3 Pin Assignment (Option 1)	14
Table 3	RS232 Connector J4 Pin Assignment	15

IMPORTANT SAFETY INSTRUCTIONS

- **The PTC-0110BA-1 contains an internal high voltage, high energy power source (96VDC battery) and large high voltage (340VDC) capacitors.**

- **The unit should not be tampered with by unauthorized personnel !!!**

- **Turning off the Input ON/OFF Switch and/or disconnecting the input connector do not turn off the UPS !!!**

- **The Power Conditioner output is not switched off by the Input ON/OFF Switch !!!**

- **The unit should only be plugged into an approved double-pole and fused 20A electrical outlet !!! (for 230VAC input use 15 AMP fuses).**

- **The Replaceable Battery Pack of the PTC-0110BA-1 (P/N M357380) contains lead-acid batteries. The Battery Pack should not be opened. It can only be replaced with a new pack (battery cells cannot be replaced individually).**

- **Dispose the Battery Pack properly. Careless disposal (such as into a fire) may cause an explosion. Local regulations may require controlled disposal of lead-acid batteries. Please check your local regulations before disposal.**

1. General Description

1.1 Intended Applications

The PTC-0110BA-1 is a high quality, rugged, 1kW / 2KVA, 19" rack-mounted Un-interruptible Power Source (UPS). In addition to full compliance with all the requirements of MIL-STD-1399 (Section 300), the PTC-0110BA-1 is specifically designed to meet the harsh military shipboard environment. The high reliability and ruggedness of the PTC-0110BA-1 make it an excellent choice not only for military shipboard applications, but for critical shore-based applications as well.

1.2 Functional Overview

The PTC-0110BA-1 consists of two main sections: Power Conditioner and UPS (see Fig. 1).
The Power Conditioner is an isolation transformer (with RFI filters and spike absorbers). Both the input and output of the Power Conditioner are available to the user via the external connectors of the unit. This configuration allows the user to externally bypass the UPS section of the PTC-0110BA-1 without loosing the surge protection and noise filtering provided by the Power Conditioner. This capability is extremely important in shipboard applications since most standard commercial equipment is designed to operate safely from grounded AC lines, whereas in standard shipboard electrical systems both lines are HOT and none may be grounded. The power conditioner allows the safe connection of commercial equipment to standard shipboard electrical systems without creating a safety hazard. See Section 3 for detailed connection diagram. In addition to 115Vac, the isolation transformer provides a low voltage for the 24Vdc contactor supply. When AC input drops, the 24Vdc is provided from battery power.

The UPS is composed of a high power factor AC-DC Converter, a Removable Battery Pack, a Battery Charger, a DC-AC Inverter and a microcontroller-based Control Circuit.

The AC-DC Converter is a high frequency switching converter that provides 320VDC to the DC-AC inverter. The AC-DC converter draws clean sine input current waveform and does not induce electrical noise into the input lines.

The Removable Battery Pack contains the energy source used by the UPS to provide power during AC input failures. The Battery Pack includes eight 12V / 5AH lead-acid, sealed, maintenance-free type cells. It provides 10 minutes of full rated output power. The Battery Pack is not a serviceable item. It cannot be disassembled, and can only be replaced as a single unit.

The Battery Charger is a high frequency, voltage-regulated and current-limited DC to DC converter. It is powered from the 320VDC output of the AC-DC Input Converter and provides temperature-compensated float charge to the Battery Pack.

The DC-AC Inverter is high frequency inverter that generates clean sine-shape 115VAC voltage from the 320VDC output of the AC to DC Input Section. The DC-AC Inverter is current-limited and has an overload protection circuit that turns it off (latched) after a delay from the time the load exceeds 120%. The delay depends upon the overload level.

The Control Circuit is a microcontroller-based circuit that provides monitoring of the unit's status (battery charge, load level, input and output levels, etc.) and supports communications and front panel status indicators.

Note that when the UPS is bypassed, an external circuit breaker (or fuse) must be used in order to protect the Power Conditioner from overload. The circuit breaker may be on the input or output side of the Power Conditioner. The Power Conditioner contains internal fuses on its input. These internal fuses are intended only as a safety feature in case of an internal failure and should not be used as overload protection devices.

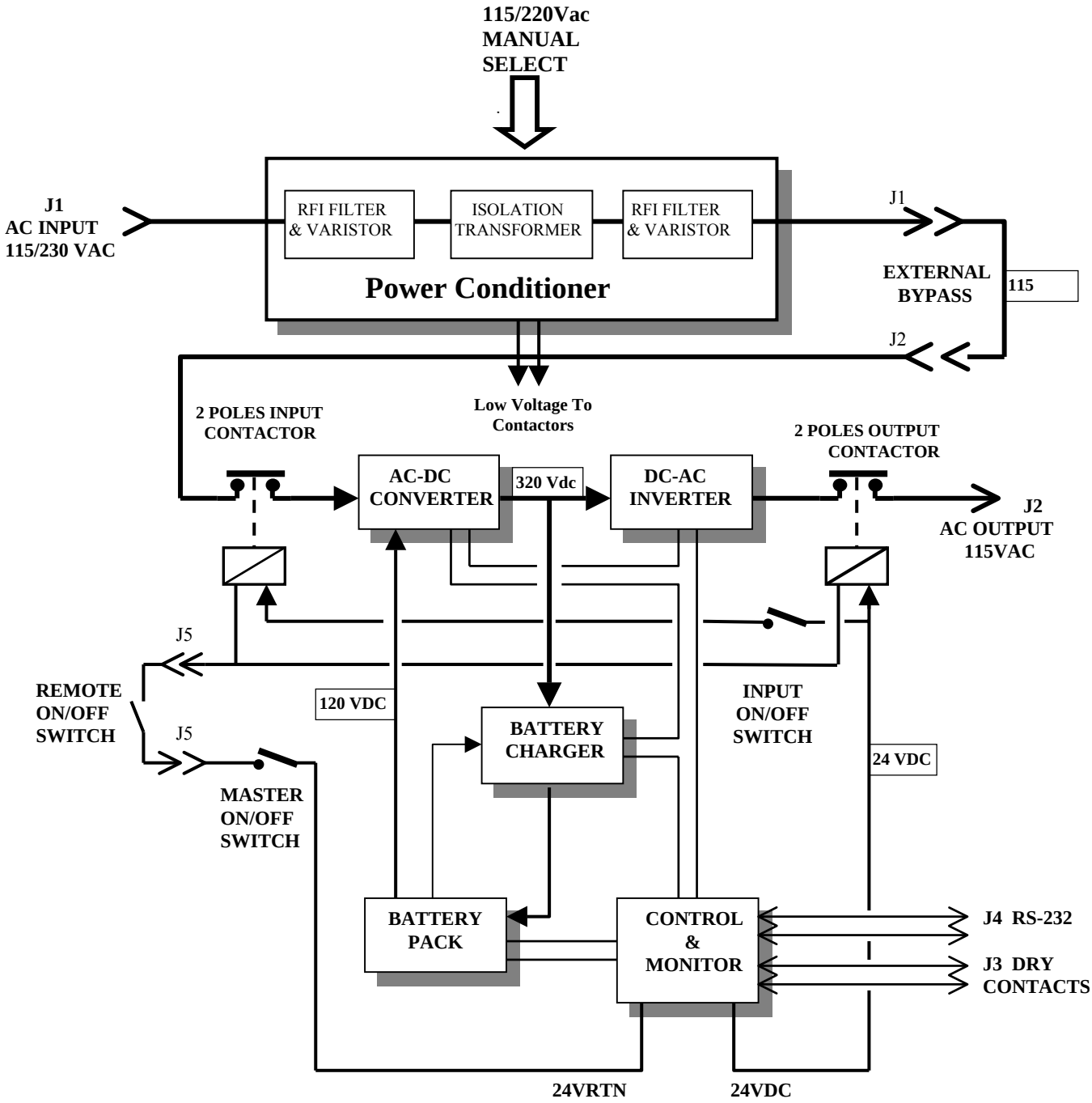


Figure 1: PTC-0110BA-1 Block Diagram

2. Setting the Input Voltage Range

Note: The input voltage range is set (prior to shipping) to 115VAC.

To change the input voltage range:

a) Turn off both Input and Master ON/OFF switches.

b) Disconnect connectors J1 and J2 from the rear panel.

c) Open the Input Voltage Setting access cover (2 screws).

d) Pull out the exposed connector handle upward.

e) Reconnect the connector in the desired location (the window should line up with the desired voltage marking).

f) Close the access cover (tighten the two screws).

g) Verify that the desired AC input voltage matches the voltage seen through the window.

3. Installation Instructions

Before installing the unit, please read carefully the Safety Instructions at the beginning of this manual.

Make sure that the input voltage setting is correct.

Make sure that the Master switch is in the OFF position.

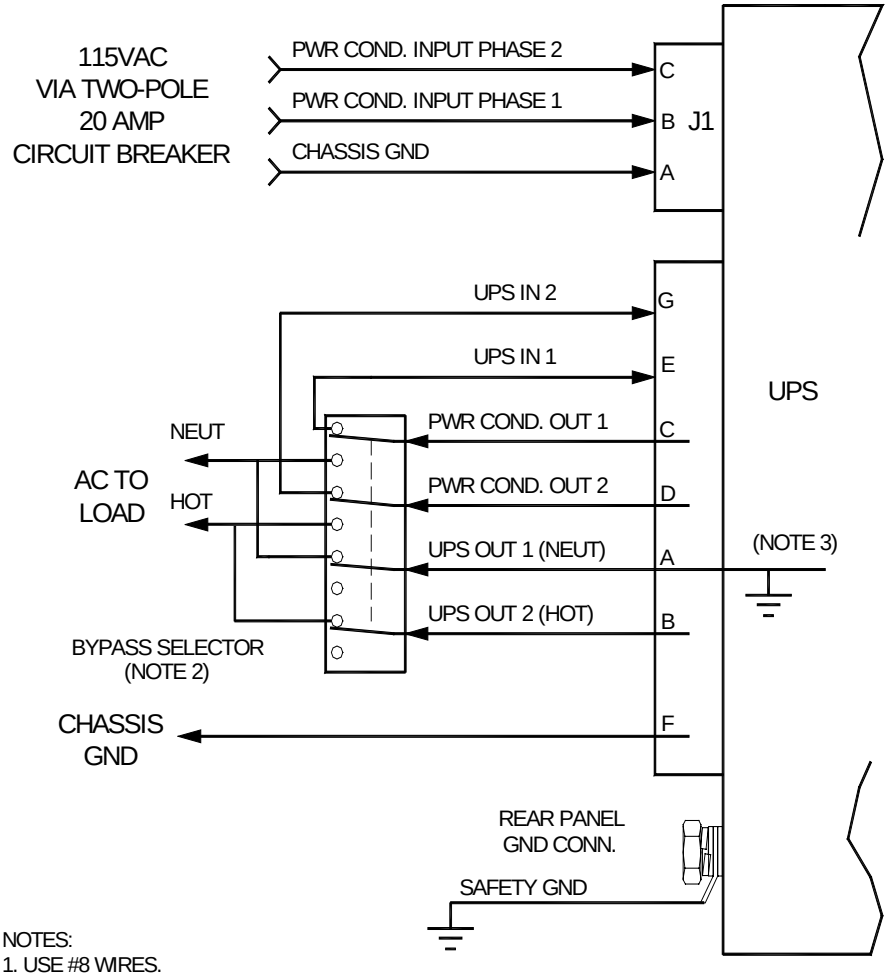
Two circular connectors (J1 and J2) are provided on the rear panel of the UPS (see Figure 6). J1 is the input connector to the Power Conditioner section of the unit. J2 carries the output of the Power Conditioner and both input and output of the UPS section. (Please refer to Fig. 1 for the definitions of the Power Conditioner and the UPS sections.)

Use Figure 2 if it is desired to use the power conditioner as a buffer between the mains and the load when the PTC-0110BA-1 is externally bypassed.

Please note that grounding of the power conditioner's output is permitted only at the output side of the bypass selector (marked as "NEUT" in figure 2).

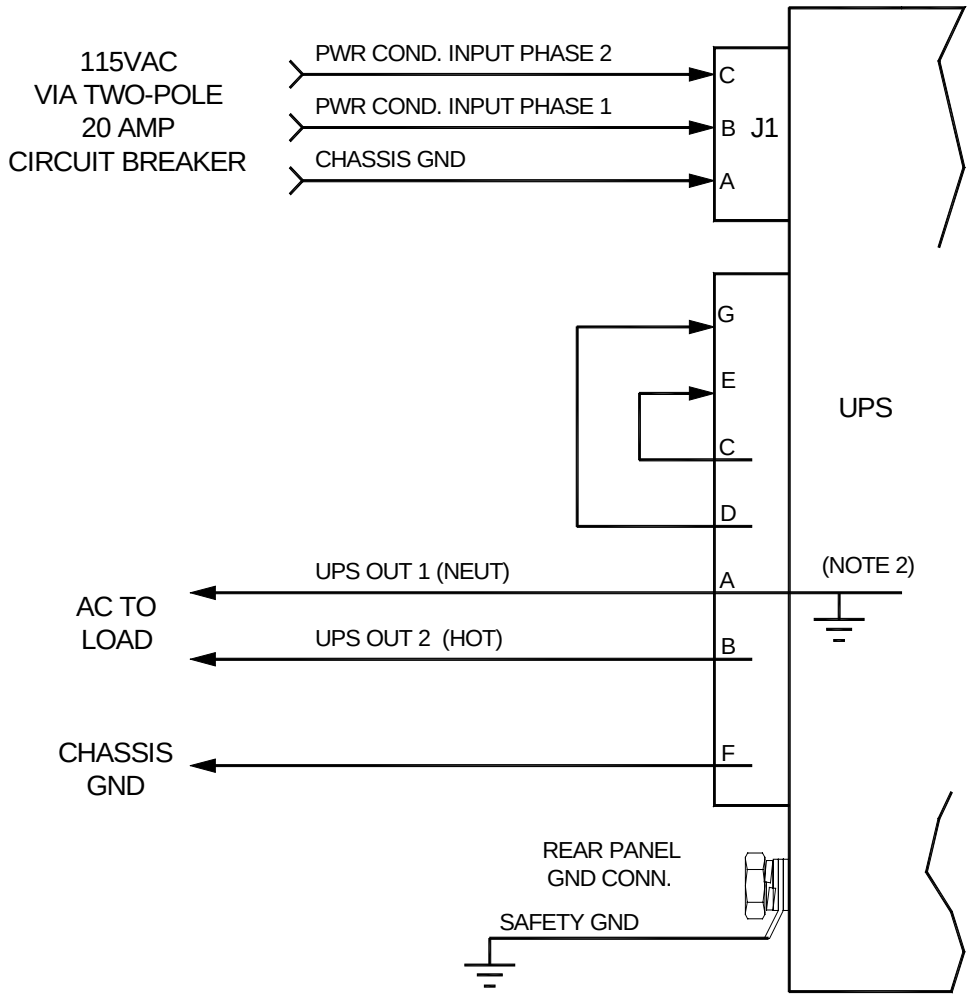
Use Figure 3 if bypass is not required,.

After the unit is installed and ready to be turned ON, see paragraph 6.1 (Turning the UPS ON and OFF) for operating instructions.



NOTES:
1. USE #8 WIRES.
2. POSITIONS OF BYPASS SELECTOR:
   UPPER POSITIONS = UPS
   LOWER POSITION = BYPASS
3. J2(A) IS INTERNALLY GROUNDED
   BY A REMOVAL JUMPER.

Figure 2 - Electrical Connections (with Bypass)



NOTES:
1. USE #8 WIRES.
2. J2(A) IS INTERNALLY GROUNDED BY A REMOVAL JUMPER.

Figure 3 - Electrical Connections (without Bypass)

4. Front Panel Description

4.1 Front Panel: Main Components (See Figure 4)

1. **Removable air filter (of the Power Conditioner's cooling air).**
2. **Visual Indicators and Switches (for detailed view see Figure 5).**
3. **Air Inlet (of main UPS heatsink).**
4. **Input ON/OFF Switch.**
5. **Master ON/OFF Switch.**

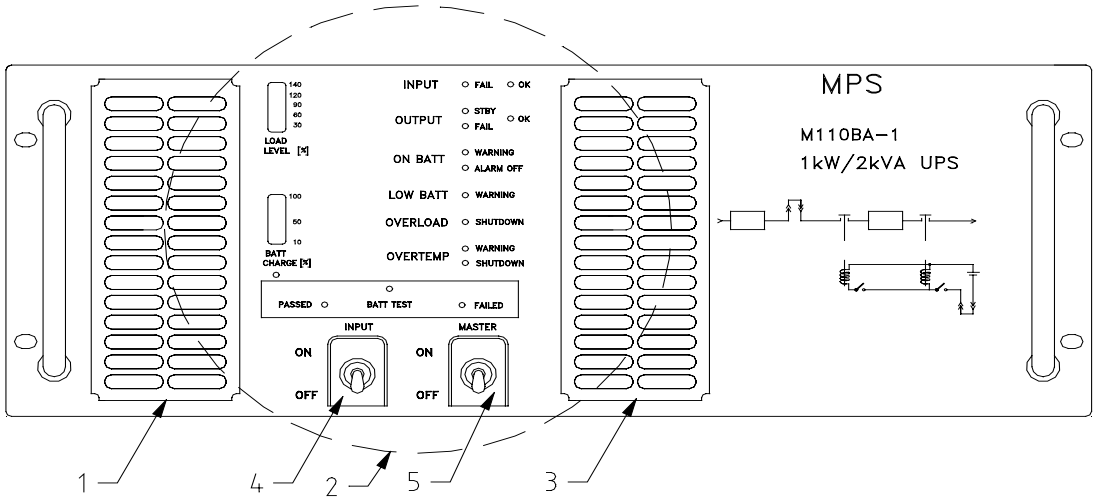


Figure 4 - Front Panel: Main Components

4.2 Front Panel: Indicators and Switches (See Figure 5)

4. **Input ON/OFF switch.**
5. **Master ON/OFF switch.**
6. **Input Fail LED (red).**
7. **Input OK LED (green).**
8. **Output Standby LED (yellow).**
9. **Output OK LED (green).**
10. **Output Fail LED (red).**
11. **On Battery Warning LED (blinking yellow).**
12. **Alarm Off Push-button.**
13. **Low Battery Warning LED (blinking yellow).**
14. **Overload Shutdown LED (red).**
15. **Overtemperature Warning LED (blinking yellow).**
16. **Overtemperature Shutdown LED (red).**
17. **Load Level Bar Graph (marked in %, 100% = 1000W).**
18. **Battery Charge Bar Graph (marked in %., 100% = 10 minutes at 1000W load).**
19. **Set Battery Charge to 100% Push-button (for maintenance only).**
20. **Battery Test Passed LED (green).**
21. **Battery Test Push-button.**
22. **Battery Test Failed LED (red).**

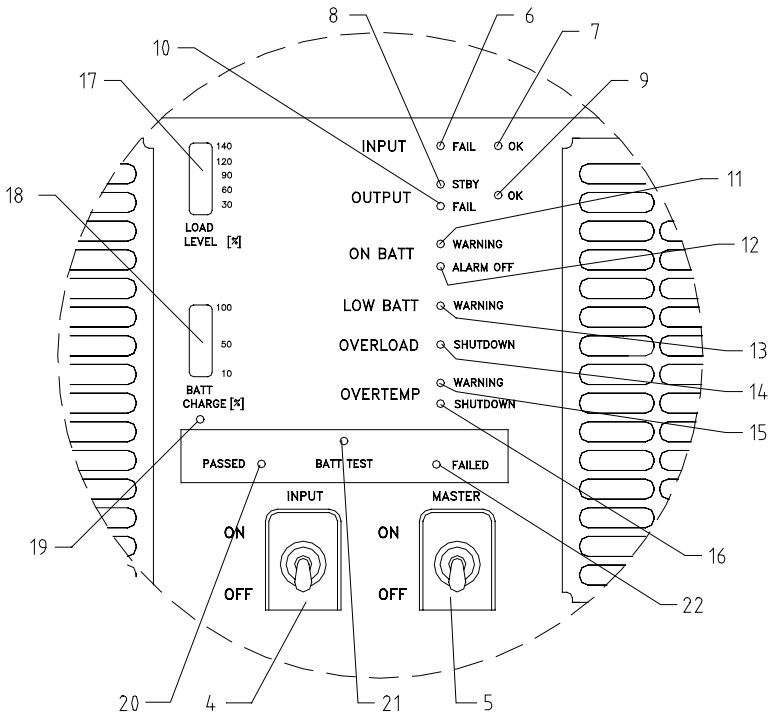


Figure 5 - Front Panel: Indicators and Switches

5. Rear Panel Description (See Figure 6)

23. Cooling Fan (Air Outlet).

24. J1 Input Power Connector (see Figure 2 for pin out).

25. J2 Output Power Connector (see Figure 2 for pin out).

26. GND Connection.

27. Dry Contacts Connector J3 (see paragraph 8 for pin out description).

28. RS232 Connector J4 (see paragraph 8 for pin out description).

29. Optional Bushing (2 places).

30. Remote ON/OFF connector J5.

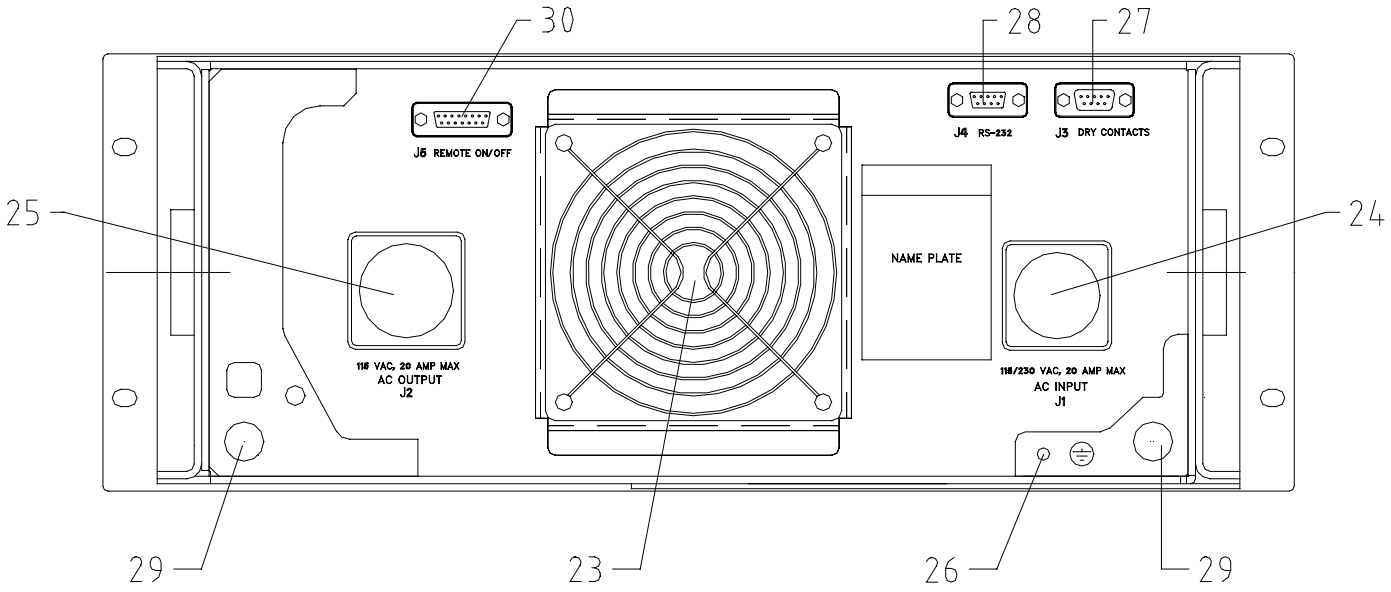


Figure 6 - Rear Panel

6. Operation, Controls and Indicators (ref. Figures 4 and 5)

6.1 Turning the UPS ON and OFF

In order to turn the UPS ON (after an electrical connection is made), turn ON the Input ON/OFF switch (4), the Master ON/OFF switch (5) and the remote ON/OFF switch. (The order is not important). If remote ON/OFF is not used, the connections of J5 (described in para. 8.3) should be installed before the unit is turned on.

When the Master ON/OFF switch (5) or the remote ON/OFF switch are turned off, the internal contactors open and disconnect both the input and the output of the UPS and it turns OFF.

When the UPS operates, turning off the Input ON/OFF switch (4) disconnects the UPS from the AC input, and the UPS then runs on battery power only.

To turn the UPS off, the Master ON/OFF switch or the remote ON/OFF switch must be in the OFF position. (It will automatically disconnect the input connector too).

Note: The UPS will not start on battery power (to avoid battery discharge during shipping and storage). Hence, the Input ON/OFF switch must be ON and AC voltage must be present at the input in order to start the UPS.

When a remote control of the UPS is desired, the Input ON/OFF and the Master ON/OFF switches on the front panel should be both in the ON position. Turning the remote ON/OFF switch ON and OFF will turn the UPS ON and OFF. (Please see paragraph 8.3).

6.2 Visual Indicators

6.2.1 Normal Operation

When the UPS is running on AC input power and both Master and Input switches are ON, the two bar graphs (17, 18), the green Input OK LED (7) and the green Output OK LED (9) are on.

The Load Level Bar Graph (17) indicates the loading percentage of the UPS. 100% load is equal to 1500W of output power. The lower six positions of the Load Level Bar Graph (15% to 75%) are green. The next three positions (80%, 110%, 120%) are orange and the two uppermost positions (130% and 140%) are red. The colors do not have any special significance and are only intended to assist fast scanning of the load level.

The Battery Charge Bar Graph (18) indicates the percentage charge level of the battery. 100% signifies that at least 10 minutes of full load will be supported by the battery, 50% signifies 5 minutes at full load and so on. Lower loads result in longer expected battery operation time. When the battery is being charged, the uppermost active segment of the Battery Charge Bar Graph blinks to indicate that charging is on.

6.2.2 Standby Mode

When the yellow Output Standby LED (8) is on, the UPS is in the Standby Mode. In this Mode the DC-AC inverter is OFF and the output contactor is open, but all other function of the UPS are active (including battery charging and RS-232 communication port). The UPS reaches this mode when command by the RS-232 or the "dry relays" into this mode.

6.2.3 Input AC Failure

When the input AC voltage is below the minimum required for proper operation, the UPS runs on battery power. During this condition the red Input Fail LED (6) is on, the yellow On Battery Warning LED (11) blinks, and five seconds after input power loss an audible alarm starts beeping once every five seconds.

To turn off the audible alarm, press momentarily on the Alarm OFF Push-button (12). When the button is pressed, a short beep will sound to indicate compliance.

During battery operations, the Battery Charge Bar Graph (18) continuously displays the battery charge level. When the charge in the battery drops below 35%, the yellow Low Battery Warning LED (13) starts blinking (indicating that less than 3.5 minutes of full load may be supported by the battery) and the audible alarm emits two short beeps once every five seconds..

To turn off the audible alarm, press momentarily on the Alarm OFF Push-button (12). When the button is pressed, a short beep will sound to indicate compliance.

When the Battery Charge Bar Graph reaches 0% (no segments are lit), the UPS will continue to operate until the actual voltage of the battery trips the battery protection circuit and shuts down the UPS.

When the input AC voltage recovers, the UPS will turn on automatically.

6.2.4 Overload Condition

If the load exceeds the rating of the UPS or there is a short circuit on the UPS's output, the protection circuit of the UPS will shut down the UPS output (after a short delay, depending on the depth of the overload).

This condition is indicated by the red Output Fail LED (10) and the red Overload Shutdown LED (14). To recover from overload shutdown:

Turn off the Master ON/OFF switch (5).
Remove the overload (or short circuit) from the UPS output.
Turn on the Master ON/OFF switch (5).

The output may turn on immediately or after a short delay, depending on the duration the unit was off. During this delay the yellow Output Standby LED (8) blinks.

6.2.5 Over Temperature Condition

When the internal temperature of the UPS exceeds a preset level, the yellow Over Temperature Warning LED (15) blinks and audible alarm sounds at one second intervals, 50% duty cycle.

Three minutes after the Over Temperature Warning LED starts to blink (and if the temperature does not drop), the UPS shuts itself off. This condition is indicated by the red Over Temperature Shutdown LED (16) and the red Output Fail Led (10).

Recovery from Over Temperature Shutdown is automatic when the temperature drops.
Check condition of the Air Filter on the front panel. If it is dirty - clean it and re-install into the unit.

6.3 Battery Test

Battery Test may be invoked only if the UPS runs on AC input power, the Battery Charge level is above 85%, the load is above 35% and the battery is not engaged in supporting Input Power Limit.

If Battery Test is denied due to low charge level, the Charge Level Bar Graph blinks once when the Battery Test Push-button is pressed.

To test the battery, press momentarily on the Battery Test Push-button (21). The green Battery Test Passed LED (20) will blink for about 3 seconds (indicating that Battery Test is running). After about 3 seconds, either the red Battery Test Failed LED (22) will turn on (and latch), indicating a bad battery, or the green Battery Test Passed LED (20) will turn on for about 20 seconds, indicating that battery successfully passed the test.

The Battery Test may be repeated only after at least 20 seconds have elapsed since the last test.

7. Taking Care of the Battery

7.1 Battery Service Life

The gel lead-acid, sealed and maintenance-free battery used in the PTC-0110BA-1 is of the highest quality. Nevertheless, it is a Limited Life Item, and its life expectancy depends upon its operating and storage conditions.
The three most important factors that determine the life of the battery are:

Temperature
Storage Conditions
Charge-Discharge Cycles

Temperature
The battery used in the PTC-010BA-1 is sealed and does not "dry up" or lose gasses, but its end of service life is brought about by the gradual corrosion of the electrodes. This process is accelerated by high operating temperatures. Every 10°C rise above 20°C will reduce the battery service life by half.

Storage Conditions
When lead-acid batteries are stored for extended periods of time, lead sulfate is formed on the negative plates and insulates them.
The sulfating rate depends on the ambient temperature and the charge level of the battery. High temperature and low charge level accelerate the sulfating and reduce the battery life.
In order to protect your battery from damage during storage:

- **Make sure the battery is fully charged periodically (every 4 months if the temperature is approximately 24°C, and every two months if the temperature is higher than 37°C) by operating the UPS for at least four hours.**
- **Store the batteries in a cool place (may be stored separately from the UPS).**
- **Never store a discharged battery !!!**

Charge-discharge Cycles

The number of times and the depth of battery discharges (during AC input failure) affects the service life of the battery.

If the battery is allowed to discharge only to 50% of its charge, the number of charge-discharge cycles (before it fails) will be three times the number of cycles had it been allowed to reach 30% charge.

Battery life may be prolonged by limiting the operating time on battery power to the minimum required by the system to perform an orderly shutdown.

7.2 Replacing the Battery Pack

For ease of use, the battery of the PTC-0110BA-1 is packaged within a Removable Battery Pack (P/N M357380) that may be ordered separately.
During storage, the Battery Pack may be removed and stored separately in a cooled ambient.

To remove the Battery Pack from the UPS:

a) Turn OFF the Master ON/OFF switches.

b) Disconnect J1 and J2 from the rear panel.

c) Open seven screws on the battery's rear cover.

d) Open the Battery Connector access cover. Remove screws.

e) Disconnect the connector by pulling upward.

f) Unscrew the right battery's screws on the top and three screws on the right side of the UPS (marked by a B" on the top and recessed on the side).

g) Hold the Battery Pack by the two edges on the sides (Caution: Two-man lift !!) and lift it straight up.

To install a new battery:

a) Lower the Battery Pack straight into its place (at the right side of the UPS). Verify that the battery mating connector and harness (near the front panel) are not damaged by the battery.

b) Install the screws on the top and the right side without tightening them yet. After all screws are in, torque them at 11 IN.LB for the #6 top screws and 22 IN.LB for the #8 side screws. Note: Suitable locking compound (Locktite 242, or similar) should be applied to all screws.

c) Connect the battery connector.

d) Close the battery connector cover and tighten its screws (6.5 IN.LB).

e) Close the battery's rear cover and tighten its screws (6.5 IN.LB).

f) Reconnect J1 and J2 to the rear panel.

The unit is now ready for operation.

Note: If the new battery is fully charged, press the Set-Battery-Charge-to-100% Push-Button for ten seconds to set the charge level to full scale.

8. Communications and Remote Control

8.1 Dry Contacts Interface

Dry Contacts Interface is available through connector J3 (a DB9 male connector located on the rear panel). This interface allows control and monitoring of the UPS by a server. Two configurations are available: Option 0 (Standard) and Option 1.

8.1.1 Option 0 (Standard) Dry Contacts Interface

Table 1 shows J3 pin assignment for Standard configuration, Option 0.

Table 1 Dry Contacts Connector J3 Pin Assignment, Standard configuration, Option 0

PIN	I/O	DESCRIPTION	NOTES
1	O	Fault Detect Signal Low	(1)
2	O	Fault Detect Signal High	(1)
3	I	Remote Shutdown	(2)
4	O	Not Battery Operation	(3)
5		System Common Ground	
6		N.C.	
7	O	Battery Voltage Low	(4)
8	O	UPS On	(5)
9	O	Input Power Loss, Battery operation	(3)

Notes to Table 1:

1. **Pin 1 is shorted to pin 2 when any one of the following conditions occurs:**
   Over Temperature Condition
   Battery failure
   Charger Failure
   Internal UPS Controller Failure

2. **Connecting 5 to 12Vdc (+ to pin 3, - to pin 5) causes the UPS to shutdown if in Battery Mode (latched). If in AC mode, the UPS enters a Standby Mode (Ac output is off, all other functions are on.)**

3. **If the UPS operates on battery power, pin 9 is shorted to pin 5 and pin 4 is open. Otherwise, pin 4 is shorted to pin 5 and pin 9 is open.**

4. **If battery voltage is low, pin 7 is shorted to pin 5. Otherwise, pin 7 is open.**

5. **If UPS output is OK, pin 8 is shorted to pin 5. Otherwise, pin 8 is open.**

Figure 7 shows the dry contacts interface circuits for Option 0.

8.1.2 Option 1 Dry Contacts Interface

Table 2 shows J3 pin assignment for Option 1. In this option the server interfaces to the UPS via a quasi - RS232 communication link

Table 2 Dry Contacts Connector J3 Pin Assignment, Option 1

PIN	DESCRIPTION	NOTES
1	Remote Shutdown Return	(1)
2	Mains Fail Relay, normally closed	(2)
3	Mains Fail Relay, normally open	(2)
4	Low Bat Relay, normally open	(3)
5	Low Bat Relay, normally closed	(3)
6	Remote Shutdown	(1)
7	Mains Fail Relay, center pole	(2)
8	Low Bat Relay, center pole	(3)
9	N.C.	

Notes to Table 2:

1. **Connecting 5 to 12Vdc (+ to pin 6, - to pin 1) causes the UPS to shutdown if in Battery Mode (latched).**
2. **If AC input is good, pin 7 is shorted to pin 2 and pin 3 is open.**
   If AC input is bad, pin 7 is shorted to pin 3 and pin 2 is open.
3. **If battery voltage is good, Pin 8 is shorted to pin 5 and pin 4 is open.**
   If battery voltage is bad, Pin 8 is shorted to pin 4 and pin 5 is open

Fig 8 shows the dry contacts interface circuits for Option 1.

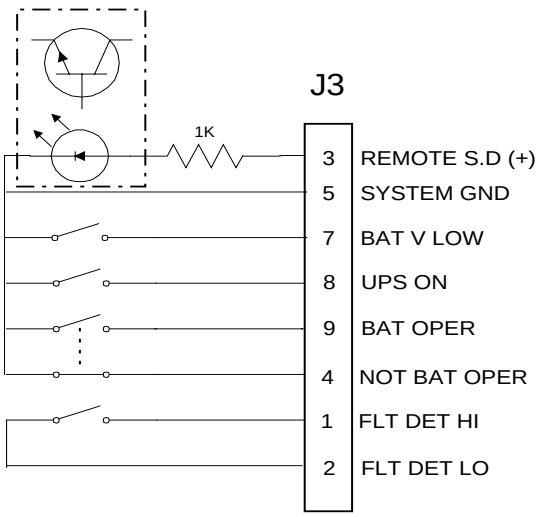


Figure 7 - Dry Contacts - Option 0

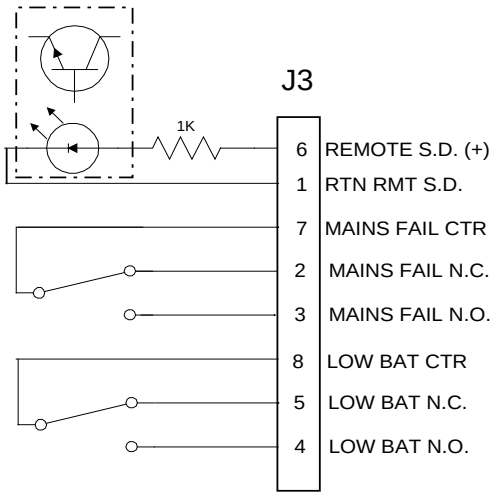


Figure 8 - Dry Contacts - Option 1

8.2 RS-232 Communication Interface

The RS232 serial communication interface is available through connector J4 (a DB9 female connector located on the rear panel of the UPS.) This interface allows control and monitoring of the UPS by a host computer through the serial RS232 communication link. For further information about this feature refer the PTC-0120BA-1 Software User Manual. Table 3 shows the standard RS232 pin assignment.

Table 3 - RS232 Connector J4 Pin Assignment

Pin	I/O	Symbol	Description
1	Internally shorted to J3 pin 5. (not used by RS232 link)		
2	Input	RXD	Receive Data
3	Output	TXD	Transmit Data
4	Output	DTR	Data Terminal Ready
5	---------	SG	Signal Ground
6	Input	DSR	Data Set Ready
7	Output	RTS	Request To Send
8	Input	CTS	Clear To Send
9	Internally shorted to J3 pin 9. (not used by RS232 link)		

8.3 Remote ON/OFF Interface J5

<u>Important note:</u> The PTC-0110BA-1 is shipped with a matting connector plugged into J5, with a jumper that enables the unit. If remote ON/Off is not desired, do not remove it.

The remote ON/OFF Interface J5 provides a mean for turning the UPS ON and OFF by a remote panel switch. When pin 8 or 15 of J5 are connected to pin 7 or 14 of J5 (8 is internally connected to 15 and 7 is internally connected to 14) the UPS is enabled. It will be ON only if the Master ON/OFF is also ON. When pins 8 and 15 are not connected (externally) to pins 7 or 14 the UPS will be OFF regardless of the position of the switches on the front panel.

To control the UPS by the remote switch, leave the front panel switches in the ON position and turn the UPS ON and OFF by closing (ON) and opening (OFF) the remote switch.

The remote switch should be rated to 28Vac, 0.5AMP.

Pin	Symbol
8,15	Remote ON/OFF
7,14	Remote ON/OFF RTN
1 ÷ 6 9 ÷ 13	Not used

9. Specifications

INPUT	***Voltage***	84-165VAC or 180-260VAC (selectable) without switching to battery power. (below this level the battery will be used).
	Frequency	48-64 Hz
	Power Factor	> 98%
	Spikes	200 joules clamping device
	Isolation	Input is galvanically isolated from output and chassis (> 1 MΩ at 600VDC). Total capacitance between input and chassis is less than 0.02uf per line. Leakage current is less than 2ma. (130dB Input Isolation Transformer.) Both input wires may be "hot" I.A.W. MIL-STD-1399.
	Current waveform	Sinusoidal, with very low harmonic content I.A.W. MIL-STD-1399 section 300A.
	Line impedance	Up to 5 ohms between 100Hz and 200kHz (I.A.W. MIL-STD-1399 section 300A.)
OUTPUT	***Voltage***	115Vac ± 3% , grounded neutral (see Note 1)
	Rating	2000VA, 1000W
	Frequency	60Hz ± 0.2% (digitally synthesized from a crystal oscillator)
	Waveform	Sinusoidal , THD < 2% (linear load), < 4% (non-linear)
BATTERY	***Type***	Internal, encapsulated, sealed, maintenance-free, lead-acid.
	Capacity	Full rated power for at least 10 minutes.
	Charger	Low ripple, regulated voltage float-charger, with current limiting and temperature compensation. Fully charges the battery within 3 hours (following 10 minutes discharge at full power).
	Protection	Battery is protected from over-discharge by internal protection circuit (to avoid damage to battery in case of prolonged power outage.)
	Monitor	Battery charge level and internal impedance are monitored by the UPS micro-controller.
EMC		Meets the requirements of:
	Federal	FCC Title 47 , part 15, class A.
	Military	MIL-STD-461D, RE101, RE102, CE101, CE102, CS101 and RS103.
	ESD	All I/O lines are protected from ESD.

9. Specifications (continued)

ENVIRONMENT	***Temperature***	Non operating: -40 to +72°C Note: High temperature for prolonged duration will shorten the battery life. Operating: 0 to +52°C.
	Humidity	Up to 95%.
	Altitude	Operating: Up to 10,000 feet. Non-operating: (Air transport) 40,000 feet.
	Orientation	May be installed at any orientation.
	Mechanical shock	When packed, withstands the free fall drop and edgewise drop IAW Methods 5007.1 and 5008.1 of Federal Test Method standard 101C. When operating, withstands the high-impact shipboard shock IAW MIL-S-901D, grade A, class II., Type B.
	Vibration	When operating, withstands Type I vibration IAW MIL-STD-167-1. The UPS will endure a sweep of 1.5g sinusoidal vibration from 5 to 50 Hz for a total duration of 2 hours, and random vibration IAW MIL-STD-810D, Cat. 9, Proc. I (test condition I-3.2.11, Fig. 514.3-34)
INDICATIONS & CONTROLS	***a) Visual Indications (Front panel)***	10-segment tri-color Bar Graph for load level display. 10-segment Bar Graph for battery charge level display. "Output OK", "Output Fail" and "Standby" status lamps. "Input OK" and "Input Fail" status lamps. "On Batt " status lamp. "Batt Passed" and "Batt Failed" lamps for battery self-test. "Low Batt" warning lamp. "Overload Shutdown" status lamp. "Overtemp warning" and "Overtemp Shutdown" lamps.
	b) Test Mode	When test mode is invoked by pressing the push-button on the front panel, the UPS performs battery impedance testing without interrupting the output power (even if the battery fails) utilizing a proprietary time-sharing circuit. The test results are displayed on panel indicators. End-to-End testing of the UPS is accomplished by cycling the INPUT ON/OFF switch on the front panel.
	c) Audible Alarm	The UPS will beep when it operates on battery power or during over-temperature condition. The alarm may be silenced by pressing the "Alarm Off" push-button on the front panel.
	d) Power Switches	The PTC-0110BA-1 has two double-pole contactors, one on the input and one on the output. The input ON/OFF contactor is controlled by the input ON/OFF switch located on the front panel. The Master ON/OFF switch, located on the front panel, shuts down the UPS and opens both input and output contactors when in the OFF position.
	e) Remote ON/OFF	When the two ON/OFF pins are opened the UPS will turn OFF and the input and output contactors will open. When the two lines are shorted together the front panel switches determine the status. (The UPS is supplied with a mating connector and a jumper between the two ON/OFF pins).

INTERFACE	***Discrete interface***	Four dry contacts indicating the following conditions: "UPS ON" (Output OK) "Battery Voltage Low" "Input Power Loss" (Battery Operation) "Fault Detect" A "Shutdown" input (via opto-isolator) for remote shutdown of the UPS during AC input fail. When the AC input recovers the UPS will automatically turn ON. Two pinout configurations are available: Standard (Option -0) and Alternate (Option -1, see "SOFTWARE" below)
	Serial Interface	RS-232 Serial port (EIA-RS-232). The serial port allows transmission of status and reception of User-Programmable Options, some of which are described below: Status: Input OK, Output OK, On Battery, Low Battery, Over-Temperature Warning, Battery Test Passed/Failed, Load Level, Charge Level, status of all User Programmable Options and failure diagnostic. Commands: UPS Shutdown, UPS Standby, Initiate Battery Test, Enable/Disable Periodic Battery Test, Enable/Disable Battle Mode, Enable/Disable Aural Alarm, Set Input power Limit (see Note 2), Protection Reset (resets all latching protection circuits), System Reset (forces all User Programmable Options into their default state and resets all latching protection circuits). For the complete set of the available Status messages and Commands, refer to the User's Manual.
SCREENING		Environmental stress screening (including: thermal cycles, vibration and power burn-in) is available upon request.
ACOUSTIC NOISE		Less than 48dBA.

Notes
1. The Neutral Grounding Link is accessible to the user and may be removed to obtain a floating output.
2. This option allows the user to feed the UPS from a limited power outlet. When in this mode, momentary peak power will be supported by the internal battery.